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Amendments to Claims

1. **(Original)** An electrochemical cell, comprising:

a. an electrolyte held within a porous non-conductive matrix having a first major surface and an opposed second major surface;

b. an anode electrode supported in intimate contact with the first major surface and a cathode electrode supported in intimate contact with the second major surface; and

c. at least one porous support plate including a contact bi-layer adjacent the anode or cathode electrode supported on a porous substrate layer, wherein the contact bi-layer includes hydrophobic phase means for facilitating gas transfer and for restricting liquid absorption through a network of hydrophobic gas passages integrated throughout the contact bi-layer and the contact bi-layer also includes hydrophilic phase means for facilitating liquid transfer through a network of hydrophilic liquid passages integrated throughout the contact bi-layer, and for increasing capacitance of the cell.

2. **(Original)** The electrochemical cell of claim 1, wherein the hydrophobic phase means includes hydrophobic gas passages defined by a mixture of carbon black and a hydrophobic polymer and the hydrophilic phase means includes hydrophilic liquid passages defined by a mixture of carbon black and a proton exchange resin.

3. **(Original)** The electrochemical cell of claim 2, wherein the mixture of carbon black and a hydrophobic polymer comprises a mixture of about thirty-five to sixty-five weight per cent of a high structure carbon black and about sixty-five to thirty-five weight per cent of the hydrophobic polymer.

4. **(Original)** The electrochemical cell of claim 3, wherein the mixture of carbon black and a proton exchange resin includes about thirty to seventy weight per cent of a low structure, high surface area carbon black and about seventy to thirty weight per cent of the proton exchange resin.

5. **(Original)** The electrochemical cell of claim 4, wherein the contact bi-layer includes about fifty to eighty per cent by volume of the hydrophobic phase means and about fifty to twenty per cent by volume of the hydrophilic means.

6. **(Original)** The electrochemical cell of claim 5, wherein the substrate layer includes discrete hydrophobic regions and discrete hydrophilic regions wherein the hydrophobic regions include hydrophobic compounds to facilitate gas transfer and restrict liquid absorption through the hydrophobic regions.

7. **(Original)** The electrochemical cell of claim 6, wherein the cell is a fuel cell and the electrolyte is a proton exchange membrane.

8. **(Currently Amended)** A fuel cell for producing electrical energy from reactant and oxidant fluids, comprising an electrochemical cell according to claim 1 wherein[[:]]

~~a. a proton exchange membrane having a first major surface and an opposed second major surface;~~

~~b. an anode electrode supported in intimate contact with the first major surface and a cathode electrode supported in intimate contact with the second major surface; and,~~

~~c. at least one porous support plate including a contact bi-layer in fluid communication with the anode or cathode electrode supported on a porous substrate layer, wherein the contact bi-layer includes~~ said hydrophobic phase means comprises a hydrophobic mixture that defines a network of hydrophobic gas passages integrated throughout the contact bi-layer ~~for facilitating gas transfer and for restricting liquid absorption and the contact bi-layer also includes a~~ , and said hydrophilic phase means comprises a hydrophilic mixture that defines a network of hydrophilic liquid passages integrated throughout the contact bi-layer ~~for facilitating liquid transfer, and for increasing capacitance of the cell~~.

9. **(Original)** The fuel cell of claim 8, wherein the hydrophobic mixture further comprises a mixture of carbon black and a hydrophobic polymer and the hydrophilic mixture further comprises a mixture of carbon black and a proton exchange resin.

10. **(Original)** The fuel cell of claim 9, wherein the mixture of carbon black and a hydrophobic polymer further comprises a mixture of about thirty-five to sixty-five weight per cent of a high structure carbon black and about sixty-five to thirty-five weight per cent of the hydrophobic polymer.

11. **(Original)** The fuel cell of claim 9, wherein the mixture of carbon black and a proton exchange resin further comprises about thirty to seventy weight per cent of a low structure, high surface area carbon black and about seventy to thirty weight per cent of the proton exchange resin.

12. **(Original)** The fuel cell of claim 8, wherein the contact bi-layer includes about fifty to eight per cent by volume of the hydrophobic mixture and about fifty to twenty per cent by volume of the hydrophilic mixture.

13. **(Original)** The fuel cell of claim 8, wherein the porous substrate layer includes discrete hydrophobic regions and discrete hydrophilic regions wherein the hydrophobic regions include hydrophobic compounds to facilitate gas transfer and restrict liquid absorption through the hydrophobic regions.

14. **(Original)** The fuel cell of claim 8, wherein the porous substrate layer includes a wettability preserving compound so that a pressure differential between a coolant liquid water supplied through a water transport plate and the reactant fluid displaces most liquid water from pores within the substrate to facilitate gas transfer and retain some liquid water transfer through the substrate layer.

15, 16. **(Cancelled)**

17. **(Currently Amended)** A fuel cell, comprising:

an anode support plate and a cathode support plate and a membrane electrode assembly disposed between said anode and cathode support plates, said membrane electrode assembly comprising a polymer electrolyte membrane disposed between an anode and a cathode, at least one of said support plates comprising a hydrophilic substrate layer having pores therein;

a porous water transport plate adjacent to each said hydrophilic substrate layer, said water transport plate having a passageway for a coolant stream and another passageway for a reactant gas stream; and

each said at least one support plate comprising a partially hydrophobic bilayer disposed between said hydrophilic substrate layer and said membrane electrode assembly.

18. **(Original)** A fuel cell according to claim 17 wherein:

said bilayer includes 50% to 80% by volume of hydrophobic phase material, and between 50% and 20% by volume of hydrophilic phase material.

19. **(Currently Amended)** A fuel cell, comprising:

an anode support plate and a cathode support plate and a membrane electrode assembly disposed between said anode and cathode support plates, said membrane electrode assembly comprising a polymer electrolyte membrane disposed between an anode and a cathode, at least one of said support plates comprising a hydrophilic substrate layer having pores therein;

a porous water transport plate adjacent to each said hydrophilic substrate layer, each said water transport plate having a passageway for a coolant stream and another passageway for a reactant gas stream; and

each said one substrate layer having a porosity of between 65% and 75%.

20, 21. **(Cancelled)**

22. **(New)** An electrochemical cell, comprising:

a. an electrolyte held within a porous non-conductive matrix having a first major surface and an opposed second major surface;

b. an anode electrode supported in intimate contact with the first major surface and a cathode electrode supported in intimate contact with the second major surface; and

c. at least one porous support plate including a contact bi-layer adjacent the anode or cathode electrode supported on a porous substrate layer, wherein the contact bi-layer includes hydrophobic phase means for facilitating gas transfer and for restricting liquid absorption through a network of hydrophobic gas passages integrated throughout the contact bi-layer and the contact bi-layer also includes hydrophilic phase means for facilitating liquid transfer through a network of hydrophilic liquid passages integrated throughout the contact bi-layer, and the contact bi-layer treated to increase the capacitance of the cell.